WHAT IS CLAIMED IS:

1. A surgical implant suitable for use in a joint between the surfaces of two bones, comprising:

two rigid opposing shells, each having

an outer surface adapted to engage the surfaces of the bones of a joint in such a way that movement of the shell relative to the bone surface is resisted by friction between the outer surface and the surface of the bone;

an inner surface that is smoother than the outer surface; and

an edge between the outer surface and the inner surface;

a deformable, resilient central body disposed between the inner surfaces of the shells comprising an outer surface, at least a portion of which has a shape that complements and articulates with the shape of the inner surface of one or both rigid opposing shells to allow the inner surface of the rigid opposing shell and the outer surface of the central body to move easily with respect to each other within a constrained range of motion, but to resist such movement outside the constrained range of motion.

2. The surgical implant of claim 1, further comprising:

a flexible sheath extending between edges of the opposing shells, having an inner surface that, together with the inner surfaces of the rigid shells, defines a cavity containing the central body.

3. The surgical implant of claim 2, further comprising:

a liquid lubricant, which occupies at least a portion of the cavity.

4. The surgical implant of claim 1, wherein the inner surface of at least one of the rigid opposing shells comprises a motion limiting device disposed thereon.

5. The surgical implant of claim 4, wherein the motion limiting device comprises a bead or ridge formed on the inner surface.

6. The surgical implant of claim 5, wherein the bead or ridge is located at the edge of the shell, and extends toward the central body.

7. The surgical implant of claim 4, wherein the surface of the central body comprises a motion limiting device disposed thereon, and which contacts the motion limiting device of the shell when the implant reaches the end of an acceptable range of motion.

8. The surgical implant of claim 7, wherein the motion limiting device on the central body retainer comprises a ridge that circumscribes the area of the inner surface of the shell that contacts the outer surface of the central body.

9. The surgical implant of claim 4, wherein the motion limiting device comprises a post extending toward the deformable resilient central body, and wherein the outer surface of the central body further comprises at least one opening adapted to receive the post.

10. The surgical implant of claim 1, wherein the edge of at least one of the rigid opposing shells comprises an tab extending axially away from the central body.

11. The surgical implant of claim 10, wherein the tab is adapted to releasably receive a tool for manipulating, inserting or removing the implant.

12. The surgical implant of claim 11, wherein the edges of both rigid opposing shells comprise a tab.

13. The surgical implant of claim 1, wherein the outer surface of each rigid opposing shell is cooled with a biocompatible porous coating.

14. The surgical implant of claim 13, wherein the porous coating comprises nonspherical sintered beads of a biocompatible metal or metal alloy.

15. The surgical implant of claim 14, wherein the rigid shell comprises a titanium alloy and wherein the porous coating comprises nonspherical sintered titanium beads.

16. The surgical implant of claim 1, wherein at least one of the rigid opposing shells further comprises a closable passage between its outer surface and its inner surface.

17. The surgical implant of claim 16, wherein the closable passage comprises a hole that is closable by insertion of a correspondingly sized plug.

18. The surgical implant of claim 2, wherein the edge between the outer surface and the inner surface of the rigid opposing shells comprises a circumferential groove adapted to receive a retaining ring.

19. The surgical implant of claim 18, wherein the sheath overlaps the circumferential groove and is held against the edge of the rigid opposing shells by the retaining ring.

20. The surgical implant of claim 9, wherein the implant is a vertebral endoprosthesis.

21. A vertebral endoprosthesis, comprising:

an upper and a lower rigid, opposed, biocompatible shell, each comprising:

an outer, rough surface;

an inner, smooth concave surface; and

an edge between the surfaces;

wherein the inner smooth surface of at least one of the shells comprises a motion limiting device;

a deformable, resilient central body disposed between the inner, smooth concave surfaces of the upper and lower shells, comprising:

a smooth convex upper surface adjacent to the inner smooth concave surface of the upper shell and a smooth convex lower surface adjacent to the inner smooth concave surface of the lower shell;

motion limiting device disposed on at least one of the smooth convex upper and lower surfaces adapted to contact the motion limiting device and limit the relative motion of the shell with respect to the central body.

22. The vertebral endoprosthesis of claim 21, further comprising:

an elastic sheath disposed between the upper and lower shells and external to the central body, comprising an inner surface, an outer surface, an upper edge attached to the upper shell, and a lower edge attached to the lower shell;

wherein the inner surface of the sheath and the inner surfaces of the shells define an enclosed cavity.

23. The vertebral endoprosthesis of claim 22, further comprising a lubricant disposed within the enclosed cavity.

24. The vertebral endoprosthesis of claim 21, wherein the motion limiting device on the shell comprises a first ridge disposed on the inner surfaceof the shell, and the motion limiting device on the central body comprises a shoulder disposed on the surface of the central body.

25. The vertebral endoprosthesis of claim 24, wherein the first ridge comprises an axial extension of at least a portion of the edge of the shell toward the central body, and circumscribes the area of the inner surface that can contact the smooth convex surface of the central body.

26. The vertebral endoprosthesis of claim 24, wherein the shoulder circumscribes the convex surface of the central body.

27. The vertebral endoprosthesis of claim 21, wherein the outer surface of the shell is convex.

28. The vertebral endoprosthesis of claim 21, wherein the outer surface of the shell comprises a porous biocompatible coating.

29. The vertebral endoprosthesis of claim 28, wherein the porous biocompatible coating comprises nonspherical sintered beads of a biocompatible metal.

30. The vertebral endoprosthesis of claim 21, wherein the edge of at least one of the shells comprises a circumferential groove adapted to be overlapped by the sheath and to receive a retaining ring securing the sheath to the shell.

31. The vertebral endoprosthesis of claim 30, further comprising a retaining ring disposed in the circumferential groove, and compressing the edge of the sheath into the groove.

32. The vertebral endoprosthesis of claim 31, wherein the retaining ring comprises a wire or filament of biocompatible material, formed into a ring.

33. The vertebral endoprosthesis of claim 32, wherein the ends of the ring are laser welded.

34. The vertebral endoprosthesis of claim 21, wherein the edge of at least one of the shells comprises an tab extending axially away from the central body.

35. The vertebral endoprosthesis of claim 34, wherein the tab is adapted to releasably engage a tool for manipulating or inserting the endoprosthesis.

36. The vertebral endoprosthesis of claim 35, wherein the tab comprises an opening to releasably receive a retaining prong of the tool.

37. The vertebral endoprosthesis of claim 21, wherein the inner surface of at least one shell comprises a post extending toward the central body, and wherein the outer surface of the central body comprises at least one opening adapted to receive the post.

38. The vertebral endoprosthesis of claim 21, wherein at least one of the shells further comprises a closable passage between its outer surface and its inner surface.

39. The vertebral endoprosthesis of claim 38, wherein the closable passage comprises a hole that is closable by insertion of a correspondingly sized plug.

40. The vertebral endoprosthesis of claim 39, wherein the hole and plug are threaded with complementary threads.

41. A vertebral endoprosthesis, comprising:

an upper and a lower rigid, opposed biocompatible concavo-convex shell, each comprising:

an outer, rough convex surface, comprising a porous coating of a biocompatible material;

an inner concave surface, comprising:

a smooth contact area; and

an axial post extending toward the opposing shell; and

an edge between the surfaces, comprising:

a circumferential groove adapted to receive a retaining ring;

a first ridge circumscribing the contact area of the inner concave surface and extending axially toward the opposing shell;

a tab extending axially away from the opposing shell, and comprising an opening adapted to releasably engage a tool for manipulating, inserting, or removing the endoprosthesis;

a closable passage between the outer surface and the inner surface of the shell;

a deformable, resilient central body disposed between the inner, smooth concave surfaces of the upper and lower shells, comprising:

smooth convex upper and lower surfaces complementary and adjacent to the smooth contact area of the inner surfaces of the respective upper and lower shells;

a shoulder circumscribing each of the smooth convex upper and lower surfaces and adapted to contact the first ridge of the adjacent shell and limit the relative motion of the shell with respect to the central body;

a laterally extending equatorial ridge disposed between the first ridge of the upper concavo-convex shell and the first ridge of the lower concavo-convex shell;

an opening in the upper and lower convex contact surfaces adapted to receive the axial post of the inner surface of each shell;

an elastic sheath disposed between the upper and lower shells and external to the central body, comprising an inner surface, an outer surface, an upper edge attached to the upper shell, and a lower edge attached to the lower shell, wherein the inner surface of the sheath and the inner surfaces of the shells define an enclosed cavity;

an upper retaining ring of a biocompatible material disposed in the circumferential groove in the upper concavo-convex shell and securing the upper edge of the elastic sheath to the shell and a lower retaining ring of a biocompatible material disposed in the circumferential groove of the lower concavo-convex shell and securing the lower edge of the sheath to the shell.

42. The vertebral endoprosthesis of claim 41, further comprising:

a plug of biocompatible material disposed in the closable passages between the outer surface and inner surface of at least one of the concavo-convex shells.

43. The vertebral endoprosthesis of claim 42, further comprising:

a lubricant disposed within the implant cavity.

44. The vertebral endoprosthesis of claim 43, wherein a plug is disposed in the closable passage of each concavo-convex shell.

45. A bone joint implant comprising an encapsulated central body having a central axial opening therein.

46. The implant of claim 45 wherein the central body has at least one convex contact surface.

47. The implant of 46 wherein the central body has an upper and a lower convex contact surface.

48. A bone joint implant comprising a central body positioned between two shells, wherein the central body has a central axial opening therein.

49. The implant of claim 48 wherein the central body has at least one convex contact surface.

50. The implant of 49 wherein the central body has an upper and a lower convex contact surface.

51. A bone joint implant comprising a central body positioned between two shells, wherein the central body has a shoulder consisting of an indentation extending around at least a portion of its perimeter.

52. The implant of claim 51 wherein the central body has at least one convex contact surface.

53. The implant of claim 52 wherein the central body has an upper and a lower convex contact surface.

54. The implant of claim 51 wherein the central body has an upper shoulder and a lower shoulder.

55. The implant of claim 54 wherein the central body has at least one convex contact surface.

56. A bone joint implant comprising a central body positioned between two shells, wherein the central body has an upper and a lower contact surface, wherein an upper shoulder extends around a portion of the perimeter of the upper contact surface and a lower shoulder extends around a portion of the perimeter of the lower contact surface.

57. The implant of claim 56 wherein the central body has at least one convex contact surface.

58. The implant of claim 57 wherein the central body has an upper and a lower convex contact surface.

59. A bone joint implant comprising an encapsulated central body having an upper and a lower contact surface, wherein an upper shoulder extends around a portion of the perimeter of the upper contact surface and a lower shoulder extends around a portion of the perimeter of the lower contact surface.

60. The implant of claim 59 wherein the central body has at least one convex contact surface.

61. The implant of claim 60 wherein the central body has an upper and a lower convex contact surface.

62. A bone joint implant comprising a central body positioned between two shells, wherein each shell has a smooth inner surface that contacts the central body.

63. The implant of claim 62 wherein the inner surface is shaped to articulate with

at least a portion of the central body.

64. A bone joint implant comprising a central body positioned between two shells, wherein each shell has a machined or polished inner surface that contacts the central body.

65. The implant of claim 64 wherein the inner surface is shaped to articulate with at least a portion of the central body.

66. A bone joint implant comprising a central body positioned between two shells, wherein at least one shell has an outer surface that is coated to promote bony ingrowth.

67. The implant of claim 66 wherein the coating is formed by vacuum sintering.

68. The implant of claim 66 wherein the coating is wherein the coating is a porous coating.

69. The implant of claim 66 wherein the coating is wherein the coating is a nonspherical sintered bead coating.

70. The implant of claim 66 wherein the coating is wherein the coating is a titanium coating.

71. The implant of claim 70 wherein the titanium coating meets ASTM F-67.

72. A bone joint implant comprising a central body positioned between two shells, wherein at least one shell has a rough outer surface .

73. A bone joint implant comprising a central body positioned between two shells, wherein at least on shell has an outer surface that is coated to provide friction between the outer surface and bone .

74. A bone joint implant comprising a central body and a lubricant encapsulated within a structure having at least one opening for the introduction of the lubricant into the structure.

75. The implant of claim 74 wherein the structure includes two shells and a sleeve extending between the shells, and the opening is included in at least one of the shells.

76. The implant of claim 75 wherein both shells include openings.

77. A bone joint implant comprising a central body positioned between two shells, wherein at least one shell includes an inner surface having a central retaining post extending therefrom and adapted to allow rotation of the shells relative to the central body .

78. The implant of claim 77 wherein the retaining post is substantially centrally located on the inner surface.

79. The implant of claim 77 wherein the inner surface is of a shape that articulates with the shape of at least a portion of the central body.

80. A bone joint implant comprising a central body positioned between two shells, wherein at least one shell has an edge that includes a radial stop extending generally axially from a portion thereof .

81. The implant of claim 80 wherein at least one shell has an edge having an outer circumferential groove therein .

82. The implant of claim 80 wherein the radial stop extends generally axially a distance of less than about 2.5 mm from the edge.

83. The implant of claim 80 wherein the radial stop is adapted to contact a shoulder formed in the central body when translational, flexural, or extensional forces are applied to the implant.

84. The implant of claim 80 wherein at least one shell has an edge that includes a tab extending generally axially from a portion thereof .

85. The implant of claim 84 wherein the radial stop and the tab are on the same shell and they extend from the shell in opposite directions.

86. A bone joint implant comprising a two shells interconnected by a sleeve to form a cavity therein, and a central body having at least one indentation therein positioned within the cavity, wherein at least one of the shells includes a retaining post that extends into the indentation and at least one of the shells includes an opening to allow introduction of a lubricant into the cavity.

87. The implant of claim 86 wherein both shells include openings.

88. The implant of claim 86 wherein the opening is adapted to being sealed with a plug tool having a handle and a detachable integral plug associated therewith.

89. The implant of claim 88 wherein the plug is adapted to detach from the tool when a predetermined torque has been reached during insertion of the plug into the opening.

90. A method of introducing the lubricant into the implant of 86 comprising slightly compressing the implant to remove excess air, and injecting the lubricant into the opening.

91. A method of introducing the lubricant into the implant of claim 87 comprising: (1) sealing one of the openings, (2) slightly compressing the implant to remove excess air, (3) injecting the lubricant into the unsealed opening, and (4) sealing the second opening.

92. The method of claim 91 wherein the openings in the shells are sealed using a seal plug tool having a segment designed to disengage at a predetermined torque.

93. A bone joint implant comprising an elastomeric central body positioned between two shells wherein the central body is impregnated with a surface hardening substance.

94. A bone joint implant comprising an encapsulated elastomeric central body that is impregnated with a surface hardening substance.

95. A bone joint implant comprising an encapsulated central body that is impregnated with a surface lubricity increasing material.

96. A bone joint implant comprising a central body positioned between two shells, wherein the central body is impregnated with a surface lubricity increasing material.

97. A bone joint implant comprising a central body consisting of one or more integral materials such that the central body has a surface region that is harder than an interior region.

98. The implant of claim 97 wherein the central body is positioned between two shells, and the harder surface region interfaces with at least one of the shells.

99. The implant of claim 97 wherein the central body is encapsulated by a structure, and the harder surface region interfaces with at least a portion of that structure.

100. The implant of claim 99 wherein the structure includes two shells and a sleeve extending between the shells, and the harder surface region interfaces with at least a portion of one of the shells.

101. A bone joint implant comprising a central body having a coating thereon wherein the coating material has a different hardness from the material used to form the central body.

102. The implant of claim 101, wherein the coating increases the surface hardness of the central body.

103. A bone joint implant comprising a central body having a coating thereon, wherein the coating increases the surface lubricity of the central body.

104. A bone joint implant comprising a central body positioned between two shells, wherein the central body has a polymer coating thereon.

105. The implant of claim 104 wherein the polymer is selected from the group

consisting of polyurethanes, polycarbonates and polyethers.

106. The implant of claim 104 wherein the polymer is a slightly elastomeric biocompatible polymeric material.

107. The implant of claim 104 wherein the polymer is selected from the group consisting of Chronothane, Chronoflex, Elast-Eon II, Bionate, CarboSil-10, Tecothane, Tecoflex, and Carbothane.

108. The implant of claim 104 the coating thickness is greater than about 1 mil.

109. The implant of claim 108 wherein the coating thickness is from about 2 mil to about 5 mil.

110. The implant of claim 104 the coating is placed on the central body by dip coating.

111. A bone joint implant comprising a central body having a coating thereon characterized in that the coating material is different from the material used to form the central body

112. A bone joint implant comprising a central body having a coating thereon characterized in that the coating material is the same as the material used to form the central body.

113. The implant of claim 112 wherein the coat material has a different hardness from the material used to form the central body

114. A system of bone joint implants of varying sizes, wherein each implant comprises:

a central body positioned between an upper shell and a lower shell, wherein at least a portion of the outer surface of each shell is convex and at least a portion of the inner surface of each shell is concave; and

the convex portion of the outer surface and the concave portion of the inner

surface of the shells can each be described as a quadric surface, such that

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$$

wherein (±a,0,0), (0,±b,0), and (0,0,±c) represent the x, y, and z intercepts of the surface, respectively, and may be the same or different for the outer and inner surfaces.

115. The system of bone joint implants of claim 114 wherein a is about 11 mm.

116. The system of bone joint implants of claim 114 wherein b is about 30 mm.

117. The system of bone joint implants of claim 114 wherein c is about 10 mm.

118. The system of bone joint implants of claim 14 wherein a is about 11 mm, b is about 30 mm, and c is about 10 mm.

119. The system of bone joint implants, wherein a, b and c are the same for the outer and inner surfaces.